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ABSTRACT

The paper examines the uses of telecommunication for physically handicapped students. Basic equipment, including a modem and keyboard interface, are described. The types and uses of computer bulletin boards are also described. Among benefits of telecommunications for physically handicapped students noted in the paper are social prestige, accessible shopping and banking services, and an array of job opportunities. Information on accessing other systems is provided along with guidelines for operating bulletin board systems. The paper closes with a discussion of problems and solutions in implementing telecommunications offered by a high school class with physically handicapped students (CL)

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Telecommunication For The Physically Handicapped

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Telecommunication is one of the most popular computer applications. By connecting your computer to a modem (through a phone line) and then dialing, you can access commercial services or local boards. Appropriate communications software and hardware insures easy access to public and private boards and commercial services.

Telecommunications has expanded from basic information retrieval and electronic mail to a myriad of other services. Telnet, Compuserve, The Source, etc. offer many services beyond information retrieval and electronic mail. You can post a "letter" in seconds, look up a particular topic in an electronic encyclopedia, get the latest news on the wire services, look at stock prices or make airline reservations, or shop at home. Utilizing other services; you can bank, take college courses, or play an electronic game. With the capability for on-line conferences and "chats", lasting friendships can be made even though two people may never see each other. In short, telecommunications is an exciting computer development directly impacting disabled people who have very little opportunity to participate in activities that able-bodied people take for granted.

Non-verbal physically handicapped students can communicate via modem as well as you and I. Telecommunications and all its benefits are just as applicable to the physically handicapped user as to the able-bodied user. More importantly, telecommunications gives the physically handicapped user opportunities to interact with the environment that did not exist before. In spite of technical jargon, getting on-line is easy and enjoyable when you use software specifically made for this purpose. With a few modifications of equipment or addition of

peripherals such as switches or electronic communication boards, physically handicapped persons can be just as adept at telecommunications as able-bodied persons.

What is needed to get started? Besides a computer, disk drive and printer, you will need a modem and some type of keyboard interface. The interface may be as simple as a mouth stick or as complex as an electronic language board.

A modem comparison chart will help you find the right modem for your system. Some of the terms used to describe features may read like Greek, but essentially what you are looking for is a direct connect modem; one end plugs into the computer, the other end into the phone or wall jack. Some computers will need an interface card, so be sure to check this requirement before purchasing a modem. Also, the phone line needs to be compatible with your modem, i.e., rotary or pulse tone. Consider your needs when purchasing a modem. A basic auto dial 300 baud (approximately 300 words per minute) will meet most needs. If money is no object, you may want a 1200 baud modem although the few advantages may not offset the extra expenses. Adaptive keyboard interfaces are an important consideration for physically handicapped students. Some students may be able to use the keyboard directly. For others a mouth or head stick, switch, or electronic language board like Express or Zygo may be needed. The best person to determine what interface should be used is your occupational therapist, or in some cases a medical equipment dealer. Costs of these accessories varies from a few dollars to several thousand dollars.

Once you have your modem, you need software which allows you to

fully utilize the data base that will be accessed. Communications software allows you to automatically dial a service or bulletin board, download/upload programs, file programs, compose and send messages, print messages or files, and save messages or programs to disk. An important feature when choosing a software package is one key stroke commands to manipulate the data. This particular characteristic is important for physically handicapped students. I presently use "Data Capture." This software allows me to use one key commands from a menu to auto-dial, write, print, delete lines, save, or file data. Additionally, the software should have good documentation (easy to read manuals) and be relatively simple to understand. Your computer will somewhat limit your choices, but it's a good idea to take a look at two or three different software packages. Make a list of the features you want beforehand, then look at the software.

Prices on software varies from $50-$250 depending on the manufacturer and capabilities. Data Capture Apple IIe is relatively inexpensive ($49 and $89), but there is other software available at reasonable prices. It's best to buy software that suits your current needs. Once you are familiar with telecommunications software, you can always upgrade to a more extensive and high cost system.

Types of Computer Bulletin Boards

There are many types of computer bulletin boards waiting to be accessed by someone-you. Computer bulletin boards include those run by individuals, user groups, local boards, specialized professional boards and national boards like Tymnet, Compuserve, The Source, etc.

"The simplest and least expensive service available to you is one

to one communication. You hook the computer to the phone line; call a friend then swap data and programs or type messages to each other using your keyboard.

"The next level of service is the bulletin board system (BBS). It's the electronic equivalent of those notice boards found in laundromats, libraries and other public places. A BBS is usually run by a computer user or user groups."[1] As you get more advanced, specialized and commercial boards are available. To find out what is available, the OMNI On line Data Base Directory and the Computer Phone Book together list more than 1400 national and local boards that are available.

The addresses and costs are listed below:

Omni On line Database Directory
Mae Millar Publishing Co.
866 Third Avenue
New York, NY 10022
ISBN: 0-02-079910-1 $10.95

The Computer Phone Book
New American Library, Inc.
1633 Broadway
New York, NY 10019
ISBN: 0-452-25446-9 $9.95 [1]

All bulletin boards systems are accessed through modems and greet you with some type of menu for making choices. Also, some bulletin boards require passwords to assure that only members gain access. All BBS's formats differ slightly from one another, but again, all usually have a "help" feature to bail you out if you get into trouble while trying to use the board. For example, when I log-on Telenet, the first thing my communications software does is give a menu with four choices. One choice is to run the Data Capture. I press #1 key and a

new menu appears. From this menu, I select D for dial. Although my software has automatic dial, I prefer manual dial. When a connection is made, the menu disappears and Telnet greets me with a short commercial. It then asks me for my user name and password. In case you are slow, or have trouble, it gives you three tries to get either the user name or password right. If you don't after three tries it automatically disconnects you.

Once I am logged-on, the system tells me if I have mail in my "mailbox." I can read it and save it, or just read it without saving it to disk. If I just read it, it will be erased when I log off. After reading my mail, I can compose an answer. Once that housekeeping chore is done, I can roam through various bulletin boards looking for topics of interest.

Telenet will give you a list of bulletin boards, but once you know them, you can go directly to the boards you want. The whole process is very easy to learn and "help" is available. Another computer bulletin board, HEX (Handicapped Educational Exchange) is devoted to specifically to handicapped users. It provides information on different uses of technology and adaptations of technology to aid handicapped users.

Our high school students, do not access a commercial board. They call home, other computer users BBS's or user groups boards. On these boards they can "chat," upload and download programs, play games, etc.

Benefits of Telecommunications for the Physically Handicapped User:

The benefits of telecommunication to physically handicapped stu-

dents are enormous. As stated previously, this is one and maybe the only sphere in their lives where they're on the equal basis with able-bodied persons.

At Mesa High, physically handicapped students using telecommunications are looked up to as "experts" by other able-bodied students. It has greatly enhanced their mainstreaming and social opportunities. Roles are reversed when the able-bodied student is dependent on the disabled student for assistance within this area. Some activities that able-bodied persons take for granted such as banking or shopping, are either very difficult or impossible for severely handicapped people to perform. With the advent of telecommunications, this has changed. These types of services are just becoming available and are rapidly increasing and expanding.

Present shopping facilities are available through Comp-U-Store, a 24-hour home shopping service which offers a variety of name brand products, usually at a good discount. Some of the products offered are appliances, electronic equipment, cameras, typewriters, household furnishings, sporting goods and much more. Shopping involves a few seconds to get "on-line." You can then look at what is available, make your selection, and purchase items all while on-line by charging the order to your charge card (orders can also be paid by check). Your purchase is then mailed to you. At present, the main drawback is that there is only a text description of an item. However, it is likely that in a few years, pictures will be added to the descriptions.

Banking at home is another feature of telecommunications. Provided you have a computer and modem (and in some cases bank supplied

software), you can go on-line to pay bills, find out the status of your account, transfer money between accounts and inquire about your account. Although you cannot get cash from this system, one bank will mail travelers checks to you which you can then use much the same as cash. Security for banking by computer is extensive and valid as long as the user keeps password numbers, etc. safe.

Job Opportunities

It seems realistic to mention that computer-related job opportunities are one of the fast growing segments of the job market. Aside from programmers and service technicians; computer operators, system analysts, word processors, accountants, technical writers, information management specialists, etc. are just a few of the opportunities available. Because of telecommunications, many of these jobs will be able to be performed at a location other than the office; namely, home.

For these reasons, a computer-related job is a consideration for physically handicapped persons. It will be possible through telecommunications to make use of active minds often trapped within noncompliant bodies.

How to Access Other Systems

In the Mesa High School Physically Handicapped program we use an Apple 2 for word processing, basic academic skills reinforcement, programming, a communication device for non-oral students, recreation, and telecommunications.

We purchased the Apple 2+ because at the time it was the only computer which could interface with the adaptive devices required for

our students. However, if students are able to directly access a keyboard then other models and/or brands may be used at considerable savings. Case in point: we located an "ancient" six year old Radio Shack Model One computer system which was donated to a student in our program. Though not state of the art, it is perfectly suited to this student. By typing with a mouth stick he can now complete assignments on a word processor program as well as access the PH program computer and others via modem.

Specialized requirements aside, these are the basic requirements for telecommunications:

Hardware:

1. computer, monitor, 1 disk drive
2. auto dial 300 baud modem (with dialing compatible with phone line-touch tone or rotary)
3. printer

Software:

Communications program: Slow response time is minimized by our communications program which uses abbreviated key strokes for dialing and logging-on. It also has a built in text editor which allows students to prepare messages of any length while off-line then send the entire file using a few key strokes. Case: A physically handicapped student prepares a letter off-line in 30 minutes and sends it to her mother's home computer in less than one minute.

> The contribution to a student's self concept cannot be overestimated. Telecommunications has allowed socially isolated individuals to meet people and make friends. Our students have become acquainted with a variety of computer

users across our metropolitan area. It also provides direct access to computer hobbyists who are resource people for our students and program.

How To Operate a BBS:

In addition to the items previously mentioned for telecommunications, BBS software is necessary. There are several commercial programs available: (the following are Apple/Franklin boards)

ABBS Version 4.0 $75
Software Sorcery
Software Sorcery
7927 Jones Beach, Suite 400
McLean, VA 22102

Access: $750.00

Computer Information Intelligence, Inc.
P.O. Box 31098 (more for business)
Phoenix, AZ 85046

GBBS II * $95 Best
System version 1.7
Micro Data Products
5739 S. Olathe Court
Aurora, CO 80015
(303) 680-9292 modem (303) 699-1161 Voice

NET-Works, $99.95
Nick Namio Best
4877 Martin Road
Newburg, IN 47630

People's Message System/PMS $300.00
Bill Blue
P.O. Box 1318
Lakeside, CA 92040
619-561-7277

Beware of privately written "free" BBS programs. We have spent many frustrating hours attempting to operate a public domain program. Our program required extensive programming expertise and contained little documentation. We eventually abandoned it, in favor of a pur-

chased user-friendly system; Net-Works. Local sysops were the best resource in selecting an appropriate program.

We have found the following features desirable in a BBS program: password capability, a user log with the capability of printing selected portions, uploading, downloading, multiple boards with security levels, time limit (this requires a clock card), single keystroke commands, electronic mail, and user friendly menus. We have found it is helpful to subscribe to several computer magazines. Most magazines feature a monthly telecommunications column as Link-Up magazine is a good sysop resource. Compute, A+, Family Computing, Softtalk, Popular Computing, and Byte are only a few of the many useful monthly magazines.

Problems and Solutions

The following problems/solutions have been experienced up to now in telecommunications and with our BBS.

Problem: Cost is approximately $2000 for computer and accessories. For example, Prenke Romich Express, through which some students access the keyboard costs $3000.

Solution: Equipment was purchased by district after a rationale was written. The school board and administration realize this equipment is necessary for students to receive an appropriate education. We have found the Adaptive Firmware Card to be a less expensive, easier to use scanner. Although not as versatile as the Express, it is better suited for computer interfacing since the scanning takes place directly on the screen rather than on an adjacent keyboard. At less than $500.00, this represents a considerable savings if interfacing with

the computer is the only needed application. At the time we purchased the Express, telecommunications was a minor consideration.

Problem: We could not operate the modem. Hours were spent with high school computer teacher and student "whiz kids" trying to decipher manuals written by the technically minded. A service call to a technician revealed our modem is rotary dial while our school line is touch tone dial only.

Solution: Installation of a separate Mountain Bell phone line, cost six months and $$$.

Problem: Communications program supplied with modem doesn't allow data capture.

Solution: Purchase of a more sophisticated program. Cost: $125.00 and more delays.

Problem: System crashers and anonymous obscene messages.

Solution: October 1984, Link-Up "Crashproofing your BBS" by David Rolhman suggests:

1. set up log-on codes and passwords
2. limit the number of calls per day (clock card is needed) to three
3. make callers disclose names, addresses, and phone number
4. control secure software (all can be crashed)
5. use secure software (all can be crashed)
6. make electronic back-up daily
7. charge membership fees
8. check with local sysops for names of crashers
9. disk recovery programs

Problems: The electric wheelchair motors caused system crashes.

Solution: This was not a software problem but apparently static electricity. Spraying/wiping the area with fabric softener minimizes the problem.

Problem: Inexperienced staff.

Solution: We spent many extra hours with manuals, on phone, on other BBS's asking questions, working with students, reading magazines, talking to computer teachers in the school, and finding student whiz kids aides. We met, via modem a local college student who did volunteer consulting one afternoon a week. His help was invaluable. It is important that you keep a log of specific problems and questions. Be specific and accurate since computer types don't automatically understand the terms of the novice. They are also not aware of the specific needs of the handicapped.

Problem: Slow student response time.

Solution: This was partially minimized by Express 3 capability of storing sentences which can be sent in one stroke. A more acceptable solution was found in purchase of communications software with built in text editor. This allows our students to prepare messages off line for quick transmission.

We have students using home computers in much the same way as at school. Parents and family are enthusiastic. We hope to institute a summer school via modem. Extending time on task is an accepted method of increasing student achievement. Providing access to educational programs via modem will involve students during weekends, holidays,

and summer break, times when many disabled students are often idle through no fault of their own.

Receiving college credit via telecommunications is already a reality. A San Francisco firm, Telelearning, offers over 170 courses. Students purchase a knowledge module containing modem and communications software and then receive a course catalog. Costs are $90 for module, $35 per credit hour, $30 telecommunication fees per course plus text books and materials.

Recently, several colleges and universities have begun to pursue online education through Telelearning's communication technology. They include the University of Nebraska, Ohio University, San Diego State University, the University of Wisconsin, American Open University of the New York Institute of Technology, DeAnza College of Cupertino, California, and Central New England College in Worcester, Massachusetts. Other colleges and universities have expressed varying degrees of interest in the program.

Technically, each school will develop its courses, then forward them to Telelearning to be incorporated in the online network. Gordon stresses that courses offered by participating universities and colleges are not designed by Telelearning, but rather are products of each school and are delivered via the Telelearning network. Credits are received from the participating school.

In addition the standard software, Telelearning also offers a "Course Translator System" which enables instructors to prepare their courses in English, French, Japanese or other spoken language, and for the student's computer to secure output in standard machine code which

then becomes English.

Another firm previously involved in correspondence courses, National Education Corporation will offer 2 year associates degree programs costing from $500 to $200.

Electronic learning is rapidly expanding. Corporations, colleges, and universities are becoming involved. This is an area of promise for Physically Handicapped students. The potential education and vocational benefits are great.

We feel that now is the time to prepare Physically Handicapped students to take advantage of these opportunities. They are learning skills which will enable them to independently pursue job training in those technological areas which will be developed in the 1980's and 1990's.

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